Consilience

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Growth, Productivity, and Policy Instruments During the Lost Decade:
A Replication of Beason and Weinstein (1996) for the Period 1992-1998

Maxim L. Pinkovskiy [1]

Abstract:

We replicate the analysis of the connection between Japanese sectoral productivity growth and industrial policy performed by Beason and Weinstein (1996) of national accounts data for the period 1992 to 1999. We show that despite some positive raw correlations between growth and industrial policy tools, there is no robust association between growth and industrial policy in the 1990s. This is consistent with the conclusions of Beason and Weinstein for the high-growth period (1960-1973). We also confirm the development of some trends evident in the previous data, such as the skewed distribution of policy instrument application to politically influential industries and the inconsistent application of different instruments to industries. Overall, the data is much more consistent with a theory of Japanese industrial policy as a product of political economy than industrial policy as a response to growth and productivity.

[1] *Maxim Pinkovskiy is a senior at Columbia College, Columbia University, studying economics and mathematics. He can be contacted at mlp2005@columbia.edu.*

Introduction:

As Japan grew to exceed the U.S. in per capita GDP in the 1980s, scholars attributed its rise to the politically-uninfluenced use of policy instruments – low-interest loans, tax relief, subsidies, and protection – in order to transfer resources out of stagnating business sectors and into sectors with high growth and increasing returns to scale (Tyson and Zysman, 1990). This view informed much of U.S. trade policy towards Japan, and some of its leading proponents (Tyson) were appointed to influential positions in the U.S. government. Beason and Weinstein (1996) argue that such a view of Japanese industrial policy is mistaken; in particular, that 1) there is, if any, a negative association between Japanese sectoral productivity growth and the amount of targeting a sector receives, and 2) application of industrial policy tools is heavily skewed to politically influential sectors. We replicate the analysis of the connection between Japanese sectoral productivity growth and industrial policy performed by Beason and Weinstein (1996) over national accounts data for the period 1992 to 1999. Owing to the dismal performance of the Japanese economy during that period, the question of whether the Japanese government was targeting increasing-returns industries is no longer interesting; rather, we wish to investigate whether Beason and Weinstein's conclusions remain valid for the 1990s, our provisional hypothesis being that there is no positive association between favorable application of industrial policy to a sector and its productivity growth.

We show that despite some positive raw correlations between growth and industrial policy tools, there is no robust association between growth and industrial policy in the 1990s, as is consistent with the conclusions of Beason and Weinstein for the high-growth period (1960-1973). We also confirm the development of some trends evident in the previous data, such as the skewed distribution of policy instrument application to politically influential industries and the inconsistent application of different instruments to industries. Overall, the data is much more consistent with a theory of Japanese industrial policy as a product of political economy than industrial policy as a response to growth and productivity

Discussion of Beason and Weinstein (1996):

A traditional approach in the study of the effects of Japanese industrial policy was to consider the effects of specific policies on specific firms or industries through case studies. Beason and Weinstein (1996) argue that a superior approach considers the effect of the favorability of industrial policy relative to the mean policy across industries, or alternatively, the extent to which some sectors receive access to low-interest loans or to tax relief over and above what other sectors receive. Beason and Weinstein reason that the essence of "picking winners" consists not merely in aiding favored sectors, but in granting them treatment that other sectors do not enjoy since it is the relative differentials in profitability between sectors that drive movements of factors of production, labor and capital, from one sector into another. Using regression as well as simple correlation measures, Beason and Weinstein show that while Japanese industrial policy induced factors to flow to favored industries, the favorability of sectoral industrial policy had a negative association both with sectoral productivity growth and long-run sectoral output growth. This conclusion challenged the prevailing view that Japanese industrial policy was a significant element in the

Japanese postwar economic miracle, and suggested that policy favoritism served more to support unproductive but politically important sectors, rather than foster productivity growth in emerging ones.

Data and Variable Definitions:

In replicating Beason and Weinstein (1996), we obtain data from the same sources they used, which we list in the data appendix. We restrict our attention to low-interest loans from the Japan Development Bank (JDB), tax rates, and subsidies, and ignore the use of tariffs and quotas. We justify this omission by noting that 1) it would be extremely difficult to generate measures of tariff rates comparable to those used in Beason and Weinstein, since their source (Shouda (1982)) does not extend to the 1990s and would require out-of-sample extrapolation, and 2) it is reasonable to assume that protection is negligible in Japan owing to trade liberalization in the wake of the Uruguay Round.[2] However, since the data contains relevant information on multiple non-manufacturing industries, (non-manufacturing industries are expected to be more important in the 1990s than in the high-growth period owing to the transition to a service economy), and since the rise of non-manufacturing industries may affect the use of industrial policy tools, we include data for all available industry categories of the private sector.[3]

The key variables used in the analysis are defined as follows: sectoral gross domestic product is value added per sector in each year, deflated to 1990. Fraction JDB is the ratio of outstanding JDB loans to total outstanding loans within a sector. Tax Rate is the ratio of corporate tax rates to taxable income, while subsidy rate is the negative of the ratio of net tax receipts from a sector to its gross domestic product.[4] The labor share is the ratio of employment compensation to GDP, and the capital share is the difference between unity and the labor share. Growth is computed as the difference of logs of the lead and the current value of a variable. Productivity growth is computed according to the Tornqvist formula, as the difference in GDP growth and the sum of factor growths weighted by the average factor shares in the lead and current period. In order to look at relative policy favorability towards sectors, we follow Beason and Weinstein, and transform the policy variables into deviations from their yearly economy-wide average values.

Descriptive Data:

We first consider summary tables of the data and compare them to Table 1 of Beason and Weinstein (1996). Table 1.1 shows the average values and ranks of growth and industrial policy variables for all sectors under analysis. Looking at growth, one immediately sees the noticeable slowdown during the 1990s in comparison with the 1980s. Only electrical machinery and finance grow at 1980s levels, while all other manufacturing sectors grow at no more than 3% (lower than the median growth for 1980s), and many shrink outright. Among sectors that declined are those with heavy government support, such as

[2] This assumption comes from conversation with Prof. Weinstein

[3] We also added an aggregate "Manufacturing" sector in order to compute aggregate quantities for differencing. It is excluded in all correlations and regressions.

[4] Since the Subsidy Rate is a cross-section ratio, it is formed using quantities that are not deflated. All variable definitions follow Beason and Weinstein (1996), or were created with assent of Prof. Weinstein.

agriculture, mining, textiles, and construction. However, some of the declined sectors, such as general machinery, used to be among the high-growing sectors of the 1980s. A possible explanation may be that most sectors suffered from the economy-wide negative effects of the banking crisis, while electrical machinery and finance were able to offset some of these effects owing to the global finance and technological boom. A similar pattern is present in the productivity growth data: the only significant growth in productivity is in electrical machinery, automobiles, and finance. The decent productivity growth in finance confirms the continuation of an upward trend in the productivity of Japanese finance noted in Weinstein (2001).

Looking at the application of industrial policy tools, one sees that the distribution of the application of the policy instruments is highly skewed, a result consistent with Beason and Weinstein (1996). Mining is heavily favored with tax breaks, just as petroleum, transport and communications, and utilities are heavily favored with JDB loans. Construction, agriculture, and finance are favored with subsidies. (It is likely that the "subsidies" received by finance reflect bank recapitalization in the wake of the financial crises of the 1990s).[5] However, while in the high-growth period, some sectors appear to have been winners in the application of all or most policy tools; in the 1990s data, large gainers from some policy tools do not seem to receive favored treatment across the board, and often are large losers in the application of other tools. This is particularly evident in the differential application of JDB loans versus tax relief (taxes and subsidies). For instance, mining receives by far the largest tax breaks, but no longer has first or second rank with respect to JDB loans or subsidies, while transport and public utilities, though almost completely funded by the JDB, are in next-to-last place with respect to taxes. Similarly, petroleum refining, which receives the highest proportion of JDB loans among manufacturing firms, has the lowest subsidy rate. Textiles and processed food, which used to be large gainers from trade policy, do not appear to be especially favored with the industrial policy tools under consideration. This pattern suggests an inconsistency in the application of industrial policy tools if one considers the aim of the government to be to transfer resources to specific industries (for growth or political economy reasons) and if one considers the application of different policy tools to be fungible. This pattern can be explained if one considers that sectors prefer the application of certain tools to others (it is plausible, for instance, that some sectors may value easy credit more than tax breaks), and if sectors must negotiate for preferred treatment by the government in an environment of increasingly scarce government funds.

In contrast to the similar data from the high-growth period, it is no longer apparent that a negative correlation exists between growth and the industrial policy measures. Rank seems to be unassociated with GDP or productivity growth, and high-ranking sectors in terms of industrial policy are represented among the fast and the slow growers. When one considers the pure correlations between growth and industrial policy measures, presented in Table 1.2, one is surprised to see that JDB loans are positively correlated with GDP growth, while tax rate differentials and subsidy rates are positively correlated with productivity

[5] The relatively low ranking of agriculture in terms of low-interest loans may be explained by the fact that agriculture receives low-interest loans from governmental financial institutions other than the JDB: there exists, for instance, the Agriculture, Forestry and Fisheries Financial Corporation (Doi 2005)

growth. One does note, however, that while this observation is very surprising in light of Beason and Weinstein (1996), it is not indicative of causal links between growth and industrial policy. In fact, since JDB loans and tax rate differentials are negatively correlated, it may be the positive correlation of JDB loans with growth is driven by the loans serving as a proxy for the absence of tax breaks and subsidies. The negative correlation between JDB loans and tax rate differentials also substantiates the observation that sectors favored with easy lending are disfavored in terms of tax breaks and vice versa. Therefore, one must use regression analysis to disentangle the partial correlations between growth and industrial policy and to make any causal inference.

Table 1:
Industry Labels

Label	Industry
100	Agriculture, Forestry, Fisheries
200	Mining
300	Manufacturing
310	Foodstuffs and Beverages
320	Textile Products
331	Chemical and Allied Products
332	Petroleum Refining
333	Ceramic, Stone and Clay Products
341	Iron and Steel
342	Fabricated Metal Products
351	General Machinery
352	Electrical Machinery Equipment and Supplies
353	Transportation Equipment
354	Precision Instruments and Machinery
400	Construction
500	Wholesale and Retail Trade, Eating & Drinking Places
600	Finance and Insurance
700	Real Estate
800	Services
901	Electricity, Gas, Heat Supply and Water
902	Transport and Communications

Table 1.1:
Growth, Productivity, Policy Tools: Ranks.

Industry Label	Rank	Growth - Tornqvist	Growth - GDP 1990	Fraction JDB	Tax Rate	Subsidy Rate
352	1	7.96 (1)	6.38 (1)	-0.89 (9)	2.62 (2)	0.87 (6)
600	2	1.60 (3)	3.18 (2)	-3.57 (21)	2.59 (6)	7.13 (1)
800	3	-1.67 (12)	2.43 (3)	-2.40 (13)	-0.95 (16)	2.07 (4)
353	4	2.33 (2)	2.31 (4)	-0.21 (7)	2.62 (2)	-0.48 (13)
902	5	0.17 (5)	2.17 (5)	20.85 (2)	-1.35 (19)	-0.21 (11)
901	6	-2.08 (15)	2.12 (6)	81.10 (1)	-1.35 (19)	-2.42 (16)
500	7	-1.08 (9)	1.97 (7)	-3.17 (18)	-0.42 (15)	-0.55 (14)
700	8	-3.81 (21)	1.89 (8)	-1.96 (11)	-1.42 (21)	1.82 (5)
332	9	-3.30 (19)	1.59 (9)	16.22 (3)	-0.11 (12)	43.75 (21)
331	10	-0.64 (8)	1.59 (10)	2.40 (4)	-0.11 (12)	-0.33 (12)
300	11	0.57 (4)	0.47 (11)	-0.50 (8)	0.71 (7)	-5.02 (19)
310	12	-2.53 (17)	0.01 (12)	-2.35 (12)	-1.04 (18)	23.88 (20)
333	13	-1.12 (10)	-1.35 (13)	-1.37 (10)	-0.11 (12)	-1.61 (15)
341	14	-1.88 (13)	-1.84 (14)	1.57 (5)	0.42 (10)	-3.27 (17)
342	15	-2.04 (14)	-2.27 (15)	-2.80 (16)	0.42 (10)	-0.08 (10)
400	16	-3.76 (20)	-2.58 (16)	-3.50 (20)	-0.97 (17)	2.46 (3)
354	17	-0.19 (7)	-2.61 (17)	-3.26 (19)	2.62 (2)	0.54 (7)
100	18	-2.47 (16)	-2.80 (18)	-3.17 (17)	0.47 (9)	3.35 (2)
351	19	-2.89 (18)	-2.98 (19)	-2.78 (15)	2.62 (2)	0.17 (9)
200	20	-1.59 (11)	-3.11 (20)	0.31 (6)	14.07 (1)	0.18 (8)
320	21	-0.07 (6)	-4.63 (21)	-2.61 (14)	0.64 (8)	-3.96 (18)

Notes: Numbers in the "Rank" column represents the average of the rank in all five categories. All values in variable columns give growth rates for Tornqvist Productivity and GDP and differences for other variables. The numbers in parenthesis are ranks for the particular variable.

Table 1.2: Growth, Productivity, Policy Tools: Correlation Matrices

	Growth GDP90	Fraction JDB	Tax Rate	Subsidy Rate
Growth GDP90	1			
Fraction JDB	0.1074	1		
Tax Rate	-0.0628	-0.2011	1	
Subsidy Rate	-0.0535	-0.1537	0.144	1

	Growth Tornqvist	Fraction JDB	Tax Rate	Subsidy Rate
Growth Tornqvist	1			
Fraction JDB	-0.0732	1		
Tax Rate	0.141	-0.2099	1	
Subsidy Rate	0.1054	-0.1439	0.1568	1

Notes: All values are raw correlations. Variables are the same as those in Table 1.1.

Regression:

The model used by Beason and Weinstein (1996) involved regressing productivity growth on one- and five- year lags of the policy variable differentials. Since we are looking at a much shorter time period, and since the five-year lags (except on taxation) are insignificant in Beason and Weinstein's regression with Tornqvist growth in all specifications, we regress productivity growth only on one-year lags of the policy variable differentials. From Table 2.1, we see that the regression results broadly sustain the hypothesis of no positive association between policy variables and productivity growth. All coefficients are insignificant, the null that all coefficients are jointly zero cannot be rejected at any reasonable significance level, and the model explains only 2% of the variation. The magnitudes of the coefficients are even smaller than in Beason and Weinstein (1996), with only the coefficient on the tax differential being of the same order of magnitude as the Beason and Weinstein coefficients[6]. Therefore, one may conclude that the positive pure correlations observed earlier are products of noise, and that there is no true statistical association between productivity growth and the policy measures. A regression of GDP growth on the same variables (Table 2.1.5) produces the same null result.

[6] Since Tornqvist growth is expressed as a percentage in this paper, and is expressed as a fraction in Beason and Weinstein (1996), all coefficients should be divided by 100 to be compared with the Beason and Weinstein results in Table 5.

One may legitimately ask whether the regression results are driven by sectors that are large winners or losers by a particular policy measure, since the distribution of the policy tool applications is extremely skewed. To account for this problem in their paper, Beason and Weinstein re-estimated the model with exactly one sector omitted in each estimation. Taking the same step, we observe that omitting any one sector has almost no effect on the magnitude, significance, or sign of the coefficients, as well as on the significance and explanatory power of the model (Table 2.2). The coefficients on JDB loan differentials and on the subsidy differentials are always trivial, while the coefficient on taxes ranges from .14 to .21, which would suggest that tax relief of 5% relative to the average tax level should increase productivity by 1%, but is always insignificant at even the 10% level. The one exception to this pattern is the exclusion of mining (Table 3), which received large tax breaks and had mediocre (small negative) productivity growth during the relevant period. In the regression where mining is excluded, the coefficient on the tax rate is 0.8 and is significant at the 1% level. Nonetheless, while the specification is significant at the 5% level and explains 6% of the variation. We performed a similar exercise on the regression of GDP growth on the policy variables (tables not reproduced), and obtained a full confirmation of the original null result.

The change in regression results upon the omission of mining is a potentially important indicator of an underlying connection between tax rate differentials and productivity growth. However, looking at Table 1.1, one sees that the positive association between tax rate differentials and productivity growth may be driven by a few observations that may be the result of an imperfection of the data. The top two sectors by productivity growth, electrical machinery and automobiles, are classed as "machinery manufacturing" in the National Tax Office data, and "machinery manufacturing" is a modest winner in terms of tax relief in the 1990s. However, not all sectors in "machinery manufacturing" exhibit strong productivity growth. General machinery has the fourth lowest performance, while precision instruments has only the seventh highest. Therefore, it is entirely possible that most of the tax relief went to general machinery, and is being mistakenly attributed to having gone to electrical machinery and automobiles. Such an interpretation is plausible from a political economy perspective when one considers that general machinery was one of the fastest-growing industries in the high-growth period and was one of the slowest-growing industries in the 1990s. Failure in the sector probably resulted in a severe disappointment of expectations for owners of factors (labor and capital) invested in the sector, so the government may have pressed to aid general machinery. To see if these considerations matter for the exercise at hand, we estimate our specification over all sectors except mining and electrical machinery, and from Table 3 Model 3.2, obtain a significant coefficient of 0.5 on the tax differential, while the regression as a whole is no longer significant. Excluding all sectors in machinery manufacturing (Table 3 Model 3.3), we see that the tax differential coefficient loses significance. Therefore, if the above explanation of the unusually high tax break apparently given to electrical machinery and automobiles is correct, there is no significant positive association between tax differentials and productivity growth, and the hypothesis is sustained.

To conclude, we follow Beason and Weinstein (1996) in estimating the specification separately for sectors whose overall (not just productivity) growth was above and below the median. From Table 3 Model 3.4, we see that slow growers have similar results to Table 2.1, while fast growers (Table 3 Model 3.5) have similar results to Table 2.2, from which mining was excluded. Considering the same logic as in the previous paragraph, we look at the specification estimated over all fast growers not in machinery manufacturing (Table 3 Model 3.6), and obtain the same results as in Table 3 Model 3.2. Therefore, if machine manufacturing, with its likely mistake in representing tax breaks given to general machinery as tax breaks given to electrical machinery, is removed from the data, there are no significant differences in the specification between slow- and fast- growing firms.

TABLE 2.1
Regression Results
All Sectors Included

Variable	Model 2.1 Productivity	Model 2.1.5 Growth
JDB (1)	-0.005	0.032
	(0.20)	(1.41)
Tax Rate (1)	0.198	-0.210
	(1.38)	(0.21)
Subsidy Rate (1)	0.038	-0.360
	(0.89)	(0.36)
Constant	-0.988	-0.250
	(1.90)	(0.25)
Number of Obs	180	200
R^2	0.003	0.059
F	1.15	1.15

Notes: All values are the result of regressions using OLS. For each variable, the coefficient is the upper value, and the absolute value of the t-statistic is in parenthesis below. For variables, the number in parenthesis indicates the amount of lag between the recorded variable value and its effect on the dependent variable, in months.

TABLE 2.2
Regression Results for Productivity with Sectors Omitted

Variable	Main	100	200	300	310	320	331	332
Diff JDB (1)	-0.005	-0.008	0.011	-0.005	-0.006	-0.004	-0.005	-0.003
	(0.200)	(0.320)	(0.450)	(0.200)	(0.230)	(0.180)	(0.200)	(0.120)
Diff Tax (1)	0.198	0.183	0.807	0.198	0.195	0.192	0.198	0.194
	(1.380)	(1.270)	**(2.990)**	(1.380)	(1.320)	(1.350)	(1.360)	(1.350)
Diff Subsidy (1)	0.038	0.046	0.034	0.038	0.033	0.037	0.038	0.039
	(0.890)	(1.060)	(0.820)	(0.890)	(0.680)	(0.880)	(0.880)	(0.480)
Number Obs	180	171	171	180	171	171	171	171
R^2	0.020	0.020	0.060	0.020	0.020	0.020	0.020	0.02
F	1.150	1.250	3.690	1.150	0.930	1.110	1.140	0.85

Variable	Main	333	341	342	351	352	353	354
Diff JDB (1)	-0.005	-0.005	-0.006	-0.005	-0.007	-0.001	-0.004	-0.005
	(0.200)	(0.200)	(0.230)	(0.210)	(0.270)	(0.040)	(0.170)	(0.180)
Diff Tax (1)	0.198	0.197	0.187	0.21	0.207	0.144	0.182	0.191
	(1.380)	(1.340)	(1.320)	(1.420)	(1.440)	(1.090)	(1.260)	(1.300)
Diff Subsidy (1)	0.038	0.038	0.039	0.037	0.04	0.025	0.037	0.038
	(0.890)	(0.880)	(0.940)	(0.860)	(0.950)	(0.650)	(0.860)	(0.870)
Number Obs	180	171	171	171	171	171	171	171
R^2	0.020	0.02	0.02	0.02	0.02	0.01	0.02	0.02
F	1.150	1.12	1.15	1.19	1.29	0.65	1	1.03

Variable	Main	400	500	600	700	800	901	902
Diff JDB (1)	-0.005	-0.009	-0.005	-0.003	-0.008	-0.005	0.04	-0.009
	(0.200)	(0.360)	(0.200)	(0.110)	(0.320)	(0.210)	(0.480)	(0.350)
Diff Tax (1)	0.198	0.156	0.195	0.205	0.162	0.194	0.194	0.217
	(1.380)	(1.050)	(1.320)	(1.390)	(1.100)	(1.300)	(1.330)	(1.470)
Diff Subsidy (1)	0.038	0.046	0.038	0.028	0.043	0.039	0.051	0.034
	(0.890)	(1.050)	(0.860)	(0.640)	(1.000)	(0.880)	(1.050)	(0.780)
Number Obs	180	171	171	171	171	171	171	171
R^2	0.020	0.02	0.02	0.02	0.02	0.02	0.02	0.02
F	1.150	1.06	1.09	0.93	1.04	1.09	1.08	1.25

Notes: All values are the result of regressions using OLS. For each variable, the coefficient is the upper value, and the absoulte t-statistic is in parenthesis below. Bold values are significant to 1%. For variables, the number in parenthesis indicates the amount of lag between the recorded variable value and its effect on the dependent variable, in months. The number above the results indicates the excluded sector. The results for all sectors is repeated in each row for comparison.

Table 3
Productivity Regression Results

Variable	Model 3.1 No Mining	Model 3.2 No Mining and Electrical Machinery	Model 3.3 No Mining and Machinery Mananufacture	Model 3.4 Slow Growers	Model 3.5 Fast Growers	Model 3.6 Fast Growers, No Machinery Manufacturing
JDB (1)	0.011	0.008	0.007	-0.048	0.000	-0.001
	(0.450)	(0.370)	(0.310)	(0.120)	(0.010)	(0.050)
Tax Rate (1)	0.807	0.502	0.482	0.153	1.019	0.473
	(2.990)	**(1.960)**	(1.520)	(0.910)	**(2.820)**	(1.280)
Subsidy Rate (1)	0.034	0.026	0.028	-0.046	0.057	0.045
	(0.820)	(0.710)	(0.780)	(0.520)	(1.210)	(1.160)
Constant	-1.120	-1.486	-1.436	-2.310	-0.073	-0.888
	(2.250)	**(3.230)**	**(2.930)**	(1.910)	(0.100)	(1.320)
Number of Obs	171	162	135	90	90	72
R^2	0.062	0.030	0.023	0.011	0.123	0.049
F	3.69	1.65	1.070	0.320	4.050	1.170

Notes: All values are the result of regressions using OLS. For each variable, the coefficient is the upper value, and the absolute valule of the t-statistic is in parenthesis below. Bolded values are significant at least at the 5% level. For variables, the number in parenthesis indicates the amount of lag between the recorded variable value and its effect on the dependent variable, in months.

Conclusion:

We observe that the fundamental result of Beason and Weinstein (1996) – the lack of a positive association between productivity growth and policy tool application – remains valid during the recession of the 1990s. In particular, while Beason and Weinstein (1996) found a negative association between tax rates and productivity, we find differences in policy across sectors to be largely irrelevant for productivity growth outcomes. Beason and Weinstein explain such negative associations in part by arguing that governments aid declining sectors to avoid the dislocation that follows their collapse. Since such considerations should become particularly salient in a recession, it is surprising that we do not observe negative correlations. One may conjecture that the political economy of Japanese transfers in the 1990s depended not only on the desire of governments not to disappoint expectations, but also on factors unrelated to current industry growth, such as political influence of given sectors. Such an explanation may be plausible, since it is known that certain sectors – agriculture, mining and textiles – have been consistently favored by the Japanese government for most of the postwar period, and have developed powerful advocacy groups in government for their interests.[7]

Our confirmation of Beason and Weinstein (1996) provides further evidence that the fundamental insight of this paper about the political economy of industrial policy holds true. Contrary to popular accounts, government is not observed to transfer resources from stagnating sectors into growing sectors, to correct market inefficiencies that may arise in sectors with increasing returns to scale, or to improve long-run growth. Rather, government sets taxes, subsidies, and favorable loans according to political necessity in cushioning the losses of investors in declining industries, or in responding to the wishes of organized and influential sectors. These observations question the currently accepted public finance theoretical framework in which government is viewed as a benevolent agent attempting to maximize social welfare subject to the constraints of using particular policy instruments,[8] and suggest instead that government is a bargaining process between groups competing for preferential treatment, with holders of formal power concerned far more with ensuring reelection and strengthening political support than with long-term economic efficiency. Ultimately, these results call for treating government intervention in the marketplace in public finance models as they treat supply and demand – all three should be seen as arising from the optimizing behavior of agents under resource or institutional constraints. Such a modeling approach would preclude seeing government policies as free variables that can be altered by policymakers at will, and rather consider them as part of a politico-economic equilibrium, in which only changes in the fundamental parameters of the market or political structure will lead to changes in policy.

[7] It is well-known that the LDP, Japan's most powerful party, sees agricultural workers as some of its key constituents.
[8] See e.g. the utilitarian paradigm in public finance, originating with Mirrlees (1971):
Mirrlees, J.A. (1971). "An Exploration in the Theory of Optimal Income Taxation." *Review of Economic Studies*, 38: 175-208

Data Appendix:

All data is annual and sectoral.
VALUE ADDED (GROSS DOMESTIC PRODUCT): *Annual Report on National Accounts*, ESRI 2005. Data downloaded from http://www.esri.cao.go.jp/index-e.html on 04/08/07. Data deflated by the GDP deflator provided to the price level of 1990.

EMPLOYMENT: *Annual Report on National Accounts*, ESRI 2005. Data downloaded from http://www.esri.cao.go.jp/index-e.html on 04/08/07. The calendar year table is used to avoid discrepancies with the rest of the data.

GROSS CAPITAL STOCK: *Japan Statistical Yearbook, Statistics Bureau, Management and Coordination Agency, Government of Japan,* 1992-2003. The primary source of the data is the *Capital Stock of Private Enterprises*, published by ESRI (used by Beason and Weinstein (1996).

TAXABLE INCOME AND CORPORATION TAXES: *Japan Statistical Yearbook, Statistics Bureau, Management and Coordination Agency, Government of Japan,* 1995-2005. The primary source of the data is the Sampling Survey of Corporations, which is used by Beason and Weinstein (1996). The survey assigned to each year is the survey that is begun during that year.

SUBSIDIES: Computed as the negative of the ratio of net sectoral taxes less subsidies to sectoral gross domestic product. All data from *Annual Report on National Accounts*, ESRI 2005.

JDB LOANS: *Economic Statistics Monthly, Research and Statistics Division, Bank of Japan*, 1990-1999, all issues for the month of February. Fraction JDB loans computed as ratio of total loans outstanding to the sector from the JDB over the total loans outstanding to the sector from domestically registered banks.

References:

Beason, R. and Weinstein, D. E. (1996). "Growth, Economies of Scale, and Targeting in Japan (1955-1990)." *The Review of Economics and Statistics*, 78(2): 286-295

Doi, T. (2005). "Government Financial Institutions: What and How to Reform" in Ito T.; Patrick, H.; and Weinstein, D. E. eds. *Reviving Japan's Economiy: Problems and Prescriptions.* Cambridge, Mass: The MIT Press.

Tyson, L. D., and Zysman J. (1990). "Development Strategy and Production Innovation in Japan," in C. Johnson, L. D. Tyson and J. Zysman (eds.) *Politics and Productivity: The Real Story of Why Japan Works.* New York: Ballenger Press.

Weinstein, D. E. (2001). "Historical, Structural, and Macroeconomic Perspectives on the Japanese Economic Crisis" in Blomström, Magnus; Ganges, Byron; and La Croix, Sumner eds. *Japan's New Economy: Continuity and Change in the Twenty-First Century*, New York, NY: Oxford University Press,.